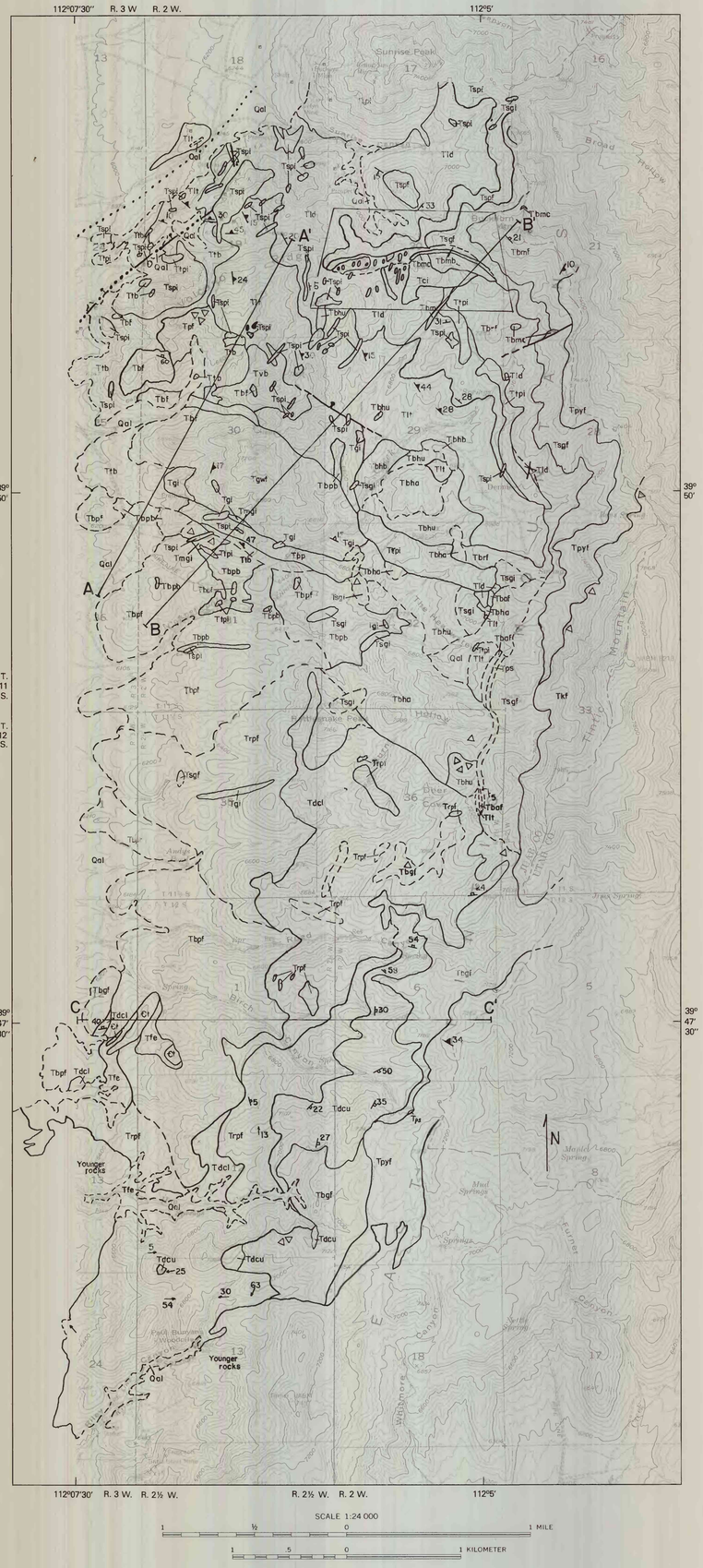
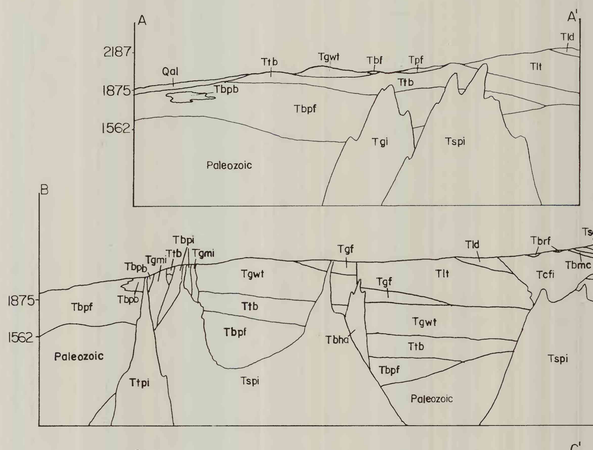
DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

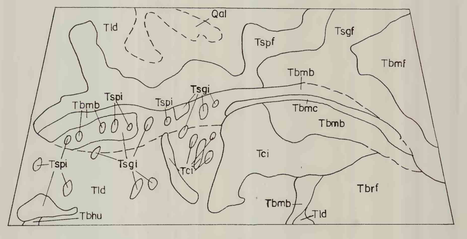
OPEN-FILE REPORT 90-0095
PLATE 1 OF 1
REVISED




Vertical exaggeration 2.5X

0 1000 2000 feet

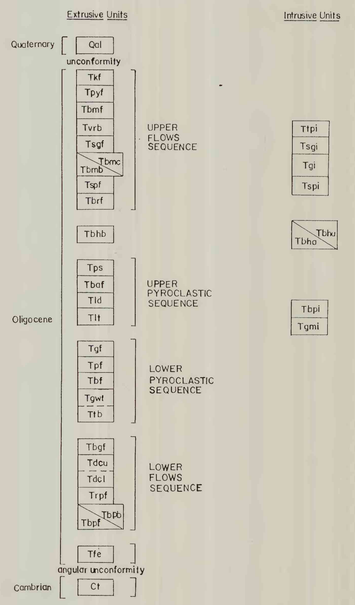



1:12000

2000 FT.

Enlarged part of northern Copperopolis Canyon

## CORRELATION OF UNITS




## DESCRIPTION OF MAP UNITS

**Qal** — **Quaternary Alluvium**--Poorly consolidated deposits of alluvium, colluvium, or basin fill, that occupies valleys and lower slopes.

UPPER FLOWS SEQUENCE

**Tkf** — **Flows of Kimball Peak**--light to dark grey, phenocryst-rich lava flows that contain phenocrysts of plagioclase, clinopyroxene, biotite, and quartz. Groundmass is aphanitic and glassy. Maximum thickness 350 m.

**Tpyf** — **Pyroxene-rich flows**--brown to dark grey phenocryst-poor flows with characteristic abundant clinopyroxene and plagioclase phenocrysts, and rare biotite. Groundmass is microcrystalline. Maximum thickness 150 m.

**Tbmf** — **Flows of Duckhorn Mountain**--green to grey-blue flows with phenocrysts of coarse blocky plagioclase, and smaller biotite and quartz. Secondary minerals include quartz, chalcedony, and calcite. Groundmass microcrystalline. Maximum thickness 150.m

**Tvrb** — **Breccias of Volcano Ridge**--chaotic breccia with pebble- to block-sized clasts of volcanic rocks and rare quartzite supported by a granular matrix of sand-sized volcaniclastic detritus.

**Tlpi** — **Tabular plagioclase-bearing intrusions**--elongate stocks and plugs with phenocrysts of coarse, clear, tabular plagioclase, clinopyroxene and orthopyroxene. Groundmass is grey and crystalline.

**Tsgf** / **Tsgi** — **Steel grey intrusions and flows**--dikes and plugs with phenocrysts of clear plagioclase laths, clinopyroxene, orthopyroxene, and rare magnetite. Groundmass is dark grey and densely crystalline. Equivalent flows are similar in mineralogy and appearance. Maximum thickness of the flows unit 120 m.

**Tbmc** / **Tbmb** — **Breccias and Carbonates of Duckhorn Mountain**--intercalated breccia and carbonate. The breccia is heterolithic, with volcanic, pebble- to small boulder-sized clasts supported by a blue-grey, ashy, biotite-bearing matrix. The carbonate bodies are thin (maximum thickness 7 m.) and generally discontinuous, although one body extends along strike about 800 m. Carbonate is grey-blue, recrystallized, thin banded and locally brecciated with unfilled or partially filled voids.

**Tci** — **Cliff-forming intrusions**--north-trending dikes whose outcrops form bold cliffs in northeastern Copperopolis Canyon. Phenocrysts include plagioclase, biotite, clinopyroxene, and magnetite. The groundmass is dark grey-green and aphanitic to microcrystalline.

**Tspf** / **Tspi** — **Monzonite Porphyry of Sunrise Peak intrusions and flows**--equant plugs and northeast-trending dikes with phenocrysts of abundant, blocky, white plagioclase, biotite, clinopyroxene, and magnetite. Groundmass is green and microcrystalline to aphanitic. Equivalent flows are similar in mineralogy and appearance. Maximum thickness of the flows unit is approximately 60 m.

**Tbrf** — **Biotite-rich flows**--dark grey flows with phenocrysts of abundant, euhedral biotite, plagioclase, clinopyroxene, and rare magnetite. Groundmass is light to dark grey and aphanitic, and locally exhibits a dull lustre. Maximum thickness 100 m.

**Tbhu** / **Tbha** — **Latite Porphyry of Burnt Hollow**--main intrusion displays intense argillic and locally silicic alteration (Tbha). The phenocryst assemblage is indicated by rectangular pits from altered plagioclase and rare relict quartz and biotite. The groundmass is bleached white and composed almost entirely of secondary clays. Local silicification yields a porcelaneous groundmass. Argillic alteration generally decreases northward. Unaltered satellite plugs (Tbu) are red-purple and contain coarse plagioclase, biotite and rare sanidine phenocrysts in a crystalline groundmass.

**Tbhb** — **Breccias of Burnt Hollow**--localized on the margins of the main stock of the Latite Porphyry of Burnt Hollow. The breccia is heterolithic, with volcanic, pebble- to small boulder-sized clasts supported by a granular matrix of sand-sized volcaniclastic detritus.

UPPER PYROCLASTIC SEQUENCE

**Tps** — **Pumiceous Strata**--thin-bedded interlayered coarse- to fine-grained white ash and volcanigenic detritus. Crystals in ash include quartz, plagioclase, and biotite. Subangular, sand- to pebble-sized igneous lithics and pumice fragments are randomly distributed. White to light green, ashy matrix composes 50% to 90% of rock. Maximum thickness 25 m.

**Tbof** — **Brown Amygdoidal Flows**--dark brown-grey, sparsely vesicular flow with phenocrysts of plagioclase, clinopyroxene, and biotite. Secondary calcite is abundant. Groundmass is fine meso- to microcrystalline. Maximum thickness 30 m.

**Tgi** — **Grey brown intrusions**--randomly oriented dikes and equant plugs. Phenocrysts include sanidine, biotite and rare topaz(?). Groundmass is light grey-brown and microcrystalline.

**Tmgi** — **Mottled green intrusion**--propylitized, ovoid stock with relict phenocrysts plagioclase and rare biotite, and secondary quartz and epidote. Zones of both monolithic breccia and heterolithic breccia are present.

**Tld** — **Lacustrine Deposits**--light green to buff, thin-bedded volcaniclastic siltstone and sandstone with sparse intercalated tuff beds. Load casts, symmetrical ripple marks and plant fragments are present. Maximum thickness 285 m.

**Tlt** — **Lapilli tuff**--foliated tuff with crystals of plagioclase, sanidine, quartz, biotite, and clinopyroxene. Subangular to subrounded lapilli of igneous lithic fragments and flattened, chloritized pumice fragments are locally present. Most outcrops are moderately argillized. Maximum thickness 320 m.

LOWER PYROCLASTIC SEQUENCE

**Tgf** — **Green flows**--massive green flows with stratigraphically coherent thin breccia layers. Phenocrysts include plagioclase, quartz, and rare chloritized biotite. Groundmass is fine mesocrystalline to microcrystalline. Silica-filled northeast-trending, steeply dipping fractures are present in the western exposures. Maximum thickness is 130 m.

**Trf** — **Plagioclase-rich flows**--massive and locally autobrecciated grey-green flows and overlying heterolithic breccia. Phenocrysts include plagioclase, orthopyroxene, rare quartz, and magnetite. Secondary minerals include calcite and chlorite. Groundmass is nonlustreous and aphanitic to microcrystalline. Heterolithic breccia contains volcanic clasts, many of this flow unit, supported by a granular matrix. Maximum thickness 115 m.

**Tbf** — **Blue-grey flows**--massive blue-grey flows with abundant white plagioclase laths, rare quartz, and magnetite. Secondary minerals include chlorite, calcite and epidote. Groundmass is densely microcrystalline. Platy jointing occurs locally. Maximum thickness 115 m.

**Tgwt** — **Green welded tuff**--propylitized welded tuff with crystals of quartz, plagioclase, biotite, and rare sanidine. Subangular, lapilli-sized lithic fragments include quartzite, shale, carbonates, and igneous rocks. Flattened, chloritized pumice fragments are moderately abundant. Secondary minerals include epidote and chlorite. Maximum thickness 290 m.

**Ttb** — **Tuff breccia**--pyroclastic deposit with abundant quartzite, carbonate, shale and igneous clasts, typically lapilli- to block-sized, but including house-sized (over 20 m diameter) slide blocks. Crystals include quartz, plagioclase, biotite, rare sanidine, and magnetite. Choritized pumice chips are sparse to locally moderate. The matrix is ashy and dull white to light green. Maximum thickness 200 m.

LOWER FLOWS SEQUENCE

**Tbgf** — **Black glassy flows**--phenocryst-rich flows with local autobrecciated zones. Phenocrysts include plagioclase, clinopyroxene, biotite, and rare quartz. Groundmass is glassy, dominantly black, though variable to grey and light red, and locally vesiculated. Maximum thickness 230 m.

**Tdcu** / **Tdcl** — **Flows of Deer Cove**--flows with platy jointing, weathering grey-blue and brown. Phenocrysts include clinopyroxene, orthopyroxene, plagioclase, magnetite, and biotite localized in the upper flows. Groundmass is microcrystalline. Maximum thickness 340 m.

**Trpf** — **Flows of Rattlesnake Peak**--black massive flows with common large, poorly developed columnar joints. Phenocrysts include plagioclase, clinopyroxene, magnetite, and rare biotite. Groundmass is aphanitic and slightly lustreous. Maximum thickness 350 m.

**Tbpb** / **Tbpf** — **Black pristine flows and breccias**--black flows (Tbpf) with well-developed, small columnar joints, phenocrysts of plagioclase, clinopyroxene, and magnetite, and a dense, aphanitic groundmass. Breccias (Tbpb) are mostly monolithic and contain subrounded to angular, pebble- to block-sized, plagioclase-bearing porphyry clasts supported by an ashy matrix. Breccias and flows are intercalated in northern exposures; to the south, only massive flows are present.

**Tfe** — **FERNOW QUARTZ LATITE**--finely laminated white ashy beds overlain by white, partially welded crystal tuff with phenocrysts of smoky beta-quartz, sanidine, plagioclase, and biotite. Vitreous and grey where welding is more intense. Draped over knobs of Tintic Quartzite.

**Ct** — **TINTIC QUARTZITE**--white to pale pink, quartz-cemented, pure quartz sandstone and quartz pebble conglomerate. May be severely locally fractured. Occurs in map area only as isolated paleo-topographic highs and slide blocks in mega-breccias.

EXPLANATION

- CONTACT--Dashed where approximately located.
- FAULT--Dashed where approximately located.
- 34 STRIKE AND DIP OF BEDDING
- 34 STRIKE AND DIP OF FOLIATION IN ASH FLOW TUFF
- 34 STRIKE AND DIP OF PLATY JOINTING
- 5 TREND AND PLUNGE OF COLUMNAR JOINTS
- ◁ BRECCIATED PART OF MASSIVE UNIT

This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

# GEOLOGIC MAP OF TERTIARY ROCKS ON THE WEST FLANK OF THE EAST TINTIC MOUNTAINS, JUAB COUNTY, UTAH

By Alec Macbeth and Judith L. Hannah, 1988